

Claims

1. ~~A digital transmission system comprising a transmitter and a receiver, for transmitting a wide-band digital signal of a specific sample frequency  $F_s$ , for example a digital audio signal, via a transmission medium, and for receiving said signal, the transmitter having an input terminal for receiving the wide-band digital signal, which input terminal is coupled to an input of a signal source which forms part of the transmitter and which is constructed to generate a second digital signal and supply said signal to an output, which second digital signal comprises consecutive frames, each frame comprising a plurality of information packets, each information packet comprising  $N$  bits,  $N$  being larger than 1, the receiver comprising a decoder having an input for receiving the second digital signal, which decoder has an output coupled to an output terminal to supply the wide-band digital signal, characterized in that if  $P$  in the formula~~

$$P = \frac{BR}{N} \times \frac{n_s}{F_s}$$

is an integer, where

$BR$  is the bit rate of the second digital signal, and  $n_s$  is the number of samples of the wideband digital signal whose corresponding information, which belongs to the second

25 digital signal, is included in one frame of the second digital signal, the number of information packets  $B$  in one frame is  $P$ , and in that, if  $P$  is not an integer, the number of information packets in a number of the frames is  $P'$ ,  $P'$  being the next lower integer following  $P$ , and the number 30 of information packets in the other frames is equal to  $P'+1$  so as to exactly comply with the requirement that the average frame rate of the second digital signal should be substantially equal to  $F_s/n_s$  and that a frame should

*JK B*  
*B*

comprise at least a first frame portion including synchronising information.

2. A transmission system as claimed in Claim 1, characterized in that the first frame portion contains further information related to the number of information packets in the frame.

*a b*  
5 3. A transmission system as claimed in Claim 1 or 2, characterized in that a frame comprises a first frame portion, a second frame portion and a third frame portion, the first frame portion further including system information and the second and the third frame portion including signal information.

*a b*  
*a 4D*  
10 4. A transmission system as claimed in Claim 1, 2 or 3, characterized in that if a frame comprises  $P' + 1$  information packets, the first frame portion contains information corresponding to  $P'$ .

*a*  
15 5. A transmission system as claimed in Claim 3 or 4, the transmitter comprising a coder comprising signal-splitting means responsive to the wide-band digital signal to generate a second digital signal in the form of a number of  $M$  subsignals,  $M$  being larger than 1, and comprising means for quantising the respective subsignals, characterized in that the second frame portion of a frame contains allocation information which, for at least a number of subsignals, indicates the number of bits representing the samples of the quantised subsignals derived from said subsignals, and in that the third frame portion contains the samples of at least said quantised subsignals (if present).

*b*  
20 6. A transmission system as claimed in Claim 5, in which the signal-splitting means take the form of analysis-filter means responsive to the wide-band digital signal to generate a number of  $M$  subband signals, which analysis-filter means divide the signal band of the wide-band digital signal, applying sample-frequency reduction, into successive subbands having band numbers  $m$  increasing with the frequency, and in which the quantisation means are adapted to quantise the respective subband signals block by

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block, characterized in that for at least a number of the subband signals the allocation information in the second frame portion of a frame specifies the number of bits representing the samples of the quantised subband signals derived from said subband signals, and in that the third frame portion contains the samples of at least said quantised subband signals ~~if present~~;

7. A transmission system as claimed in Claim 6, characterized in that in addition the third frame portion includes information related to scale factors, a scale factor being associated with at least one of the quantised subband signals contained in the third frame portion, and in that the scale factor information is included in the third frame portion before the quantised subband signals.

8. A transmission system as claimed in Claim 6 ~~or 7~~, in which the receiver ~~comprises~~ a decoder <sup>comprising</sup>

synthesis-filter means responsive to the respective quantised subband signals to construct a replica of the ~~wide-band~~ <sup>first</sup> digital signal, which synthesis filter means combine the subbands, applying sample frequency

restoration to form the signal band of the ~~wide-band~~ <sup>said</sup> digital signal, characterized in that the samples of the ~~quantised~~ <sup>subband</sup> signals ~~(if present)~~ are inserted in the third frame portion in a sequence corresponding to the sequence in which said samples are applied to the synthesis-filter means upon reception in the receiver.

9. A transmission system as claimed in Claim 8, characterized in that the allocation information for the various quantised subband signals is inserted in the second frame portion in a similar sequence.

10. A transmission system as claimed in Claim 9, characterized in that the scale information for the scale factors is inserted in the third frame portion in a sequence corresponding to the sequence in which the allocation information for the quantised subband signals associated with said scale factors is included in the second frame portion.

11. A transmission system as claimed in ~~any one of the~~ <sup>Claim 6,</sup>

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a b claims 6 to 10, the <sup>first</sup> wide-band digital signal comprising a first and a second signal component, for example a digital stereo signal, the analysis-filter means being adapted to be responsive to the first and the second signal

b 5 components to generate a number of M subband signals, each subband signal comprising a first and a second subband signal component, the means being further adapted to quantise the respective first and second subband signal components in a specific subband, characterized in that the

10 second frame portion of a frame includes allocation information specifying for <sup>specific</sup> said subband the number of bits representing the samples of the quantised first and second subband signal components, derived from each of the two

b 15 subband signals of <sup>specific</sup> said subband, and in that the third frame portion includes samples of said quantised first and second subband signal components ~~(if present)~~.

12. A transmission system as claimed in Claim 11, when appendant to Claim 7, characterized in that the third frame portion includes scale-factor information for two scale factors for <sup>specific</sup> said subband, each scale factor belonging to the first or the second quantised subband signal component of said subband.

a ~~etc~~ 13. A transmission system as claimed in Claim 11 or 12, when appendant to Claim 8, in which the synthesis filter means are adapted to be responsive to the respective quantised subband signal components to construct a replica of the <sup>first</sup> wideband digital signal comprising the first and the second signal component, characterized in that the samples of the subband signal components ~~(if present)~~ are inserted in the third frame portion in a sequence corresponding to the sequence in which the samples of said subband signal components are applied to the synthesis filter means upon reception in the receiver.

a 25 14. A transmission system as claimed in Claim 13, characterized in that the allocation information for the various quantised subband signal components is inserted in the second frame portion in a similar sequence.

b 30 15. A transmission system as claimed in Claim 14,

characterized in that the scale-factor information for the scale factors is inserted in the third frame portion in a sequence corresponding to the sequence in which the allocation information for the first and second quantised subband signal components belonging to said scale factors are inserted in the second frame portion, and in that the scale-factor information is inserted in the third frame portion before the quantised subband signal components.

16. ~~A transmission system as claimed in Claim 5, characterized in that the  $(P'+1)$ -st information packet does not contain any useful information.~~ <sup>3x29</sup> ~~Claim 1,~~

17. A transmission system as claimed in <sup>any one of the</sup> ~~preceding Claims~~, characterized in that the frames comprise a fourth frame portion in which error-detection and/or error-correction information is included.

18. ~~A transmitter for use in a transmission system as claimed in <sup>Claim 129</sup> any one of the preceding Claims.~~

19. A transmitter as claimed in Claim 18, characterized in that the transmitter takes the form of a device for recording the second digital signal in a track on a record carrier.

20. A record carrier obtained by means of the transmitter as claimed in Claim 19, characterized in that the second digital signal is recorded in the track.

21. ~~A receiver for use in a transmission system as claimed in <sup>Claim 129</sup> any one of the Claims 1 to 16.~~

22. A receiver as claimed in Claim 21, characterized in that the receiver takes the form of a device for reading the second digital signal from a track on a record carrier.

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C1 add 49